TEN CASES OF ANCHYLOSIS OF THE ELBOW JOINT, AFTER TREATMENT OF FRACTURE OF THE LOWER END OF THE HUMERUS, WITH THE FORE-ARM IN THE EXTENDED POSITION: FIVE TREATED BY EXSECTION, FOUR TREATED BY INFRACTION, AND ONE NOT TREATED.

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IF I am right in the view I take of the subject, there are certain pretty well-established precepts in regard to the treatment of fractures in the vicinity of and involving the joints. Let me enumerate some of these precepts in the following form:

When a fracture is near a joint it is more difficult to make a correct diagnosis, because the soft parts are apt to be swollen, because the new point of motion cannot be easily found, and because the fragments may be interlocked or impacted.

If a fracture is near a joint it may be difficult, or even impossible, to make a complete reduction of the fragments when they are displaced. This must be so, because the joint fragment is small and short, because the soft parts are swollen, because the fragments may be impacted or interlocked, and because of the reflex spasm of the muscles which span the injured joint.

Even if the fragments can be reduced they may become redisplaced, since it is not easy to apply perfect retentive apparatus, since the irritated muscles may pull upon the joint fragment which gives attachment to them, and since the pressure of the splints may cause ulceration over the bony prominences.

An injured joint is likely to take on inflammation which may lead to adhesion and anchylosis; and among such injuries we note joint-involving fractures, but we are willing to say that some inflamed joints do become stiff.

The elbow joint is not an exception to the principles of these precepts: Here the surgeon might fail to make an exactly correct diagnosis; he might not succeed in making complete reduction of the displaced fragments; he might find that the fragments had got out of place after a few days of treatment; he might, in some instances, find that considerable traumatic arthritis would arise; and he might find that the elbow joint would become stiff, even with all the care he could give his case.

To these precepts and conclusions may be added the two following self-evident propositions:

1. An upper limb, with a stiff elbow joint, having the fore-arm in the extended position, would be the source of much disability, and the cause of much discomfort.

2. An upper limb, with a stiff elbow joint, having the fore-arm in the right-angled position, would be very useful to the patient in various ways.

In the next place let us make two statements:

1. After treatment of fracture of the lower end of the humerus, with the fore-arm in the right-angled position, I have seen cases in which there has been anchylosis of the elbow joint.

2. After treatment of fracture of the lower end of the humerus, with the fore-arm in a position more or less extended, I have seen cases in which there has been anchylosis of the elbow joint.

Here I wish to put on record the following cases, bearing on the question of position in the treatment of fractures of the lower end of the humerus. The report of these cases contains the treatment to which I resorted for the relief of the disability that appeared to arise from the primary treatment.

CASE I.—I. W. N., a laborer, twenty-nine years of age, the last week in September, 1885, came under my care for anchylosis of the left elbow joint, with the fore-arm in a position about midway between complete extension and right-angled flexion. The first week

in June, 1885, he had fallen from a height upon his left elbow and suffered from a comminuted fracture of the lower end of the left humerus. The treatment had been conducted by means of a nearly straight anterior splint, which had been kept on during the time he was under the care of his surgeon. When I saw the patient the injured limb was quite useless, and resisted every reasonable attempt to flex the fore-arm on the arm. I advised an operation as the only means by which relief would be likely to be obtained. I made an external incision over the lower end of the humerus and the upper end of the radius, and exsected the lower end of the humerus, in order to permit of right-angled flexion of the elbow joint. The condyloid fragments were firmly united in a misshapen mass, and there was bony anchylosis of the elbow joint, which had been for the most part obliterated. The limb was placed upon a right-angled splint, made of wire-cloth. This patient recovered with a somewhat useful limb; the elbow joint recovered about one-half its motion, and the strength was nearly one-half what it was before the accident.

CASE II.—J. L., a schoolboy, eight years of age, in the summer of 1889, while at play in the street fell and broke the lower end of his left humerus into several pieces. The limb was placed upon an obtuse-angled splint, so as to keep the fore-arm about midway between complete extension and right-angled flexion, and in four or five weeks the elbow joint became quite stiff and immovable. This patient was admitted to the College Hospital in September of the same year. It was found impossible to bring the fore-arm up to a right angle with the arm after using very great force; the obstruction was caused by some pieces of bone in front of the elbow joint, where they were located between the lower end of the humerus and the upper end of the radius and the ulna. On the outer side of the elbow joint over the lower end of the humerus and the upper end of the radius I made an incision down to the bone, and then with a sharp narrow chisel I cut out the deformed lower end of the humerus, so that I could flex the fore-arm above a right angle with the arm. This patient was discharged from the hospital on the 7th of January, 1890, with a very useful limb. The flexion of the fore-arm was nearly one-half of what it was originally, and the strength of the limb was such that he could lift quite heavy weights with it.

CASE III.—P. O'H., an errand boy, about ten years of age, in September, 1890, fell on the cobble-stone pavement while he was running along the street, and comminuted the lower end of the right

humerus. The limb was treated upon a nearly straight splint for four or five weeks, and at the end of that time the elbow joint had become quite firmly anchylosed. He was admitted to the College Hospital November 28, 1890. I made every reasonable effort to break up the anchylosis and obtain a useful limb, but I did not succeed. In the presence of the medical class, I cut down on the outside of the elbow joint, and exsected the lower end of the humerus with a narrow sharp chisel, when I placed the limb upon a right-angled splint made of wire-cloth. This patient improved rapidly, and on December 23 was taken home by his parents, who had become impatient with what they thought was unnecessary delay. He was very much improved, and finally had a limb that he could put to good use.

CASE IV.—A young man from the country came to consult me about his left elbow, which had become very stiff, with the fore-arm in nearly an extended position. He had been treated with a straight splint for a fracture of the lower end of the left humerus. The splint had been applied to the front of the limb, and was slightly bent. On September 23, 1891, I made a very determined attempt to bring the fore-arm up to a right angle with the arm, and was obliged to confess my failure. I had this case before the medical class, to whom I explained the nature of such injuries as the patient had sustained. Then I made an exsection of the lower end of the humerus, after the manner above indicated, and put the limb upon a double-angled splint, whose fore-arm piece was made of a piece of pine board, and whose arm-piece was made of wire-cloth. This patient improved quite rapidly, and left the hospital October 7, 1891, going to his home in the country with a very useful limb.

CASE V.—V. H. K., a boy four years of age, as he was at play with some other boys had broken his left elbow in falling from a picket fence, and, as flexing the fore-arm caused him severe pain, the case was treated with a nearly straight anterior splint. He came under my care about six weeks after the accident, when I found that the elbow joint was quite immovable, and that there was a suppurating sinus leading down to dead bone at the seat of fracture. I advised an operation for the purpose of attempting a restoration of the usefulness of the limb. From the external aspect of the elbow joint I exsected the dead bone, which I found to be a detached fragment of the external condyle of the humerus. Then I found a bony fragment firmly interposed between the lower end of the humeral

diaphysis and the upper ends of the bones of the fore-arm ; when this fragment was removed I could easily bring the fore-arm up to a right angle with the arm. The limb was then treated upon a right-angled wire-splint made of wire-cloth, this splint being readily kept clean and being firm enough to support the limb in the proper position. His parents removed him from the hospital sixteen days after the operation—April 24, 1891. This boy did not come under my observation again, but I have no doubt that he obtained a useful limb.

These five cases are important and interesting, and they raise certain points bearing upon surgical practice. Let me state some of them in the order in which they suggest themselves:

1. It was not possible to break up the anchylosed joint in any one of these cases with safety, when it came under my observation, for I made a reasonable and determined effort to bring the fore-arm up to a right angle with the arm, and failed every time.

2. In the dependent position, since the hand could not be brought toward the face and head, the patient could not use it to feed himself, nor could he make it available to any great extent in putting his clothing on and off. In each of these cases I made careful observations to determine the disability, and in every case it was very great.

3. It appeared to me that an operation alone offered any relief from the disability, and in every case the result justified the operation. A proposition of this kind is so self-evident that I only enunciate it.

4. I now ask this question: Would it not have been better surgery to have treated these cases by putting the fore-arm in the right-angled position at the outset, and by letting the anchylosis of the elbow joint take place in that position? In that way an operation would have been unnecessary. It is of no great moment for the surgeon to say that he could have avoided an anchylosis in such a case. Grant his claim ; but then he cannot treat all the cases that happen, and we must provide for surgeons of ordinary skill.

5. I am ready to say that I have for many years taught

that it is advisable and requisite to treat a fracture of the lower end of the humerus with the fore-arm in the right-angled position. I have done so from the deepest conviction, and I am more and more sure that this practice is best. And when I began to find the facts turning out in that direction, I became somewhat confirmed in the correctness of my views.

6. I am impressed with the purpose of not entering into a criticism of the views of those who differ with me in opinion and practice. But I am sure that the best thing I can do with the above cases is to tell other surgeons about them; in very truth, this is in the line of my duty, a duty which I cannot leave undone.

But I have other cases to report, in which I did not perform any cutting operation; they constitute additional evidence relevant to the issue that has been raised—the issue bearing upon the position of the fore-arm in the treatment of fracture of the lower end of the humerus. In these cases I used *force* to bring the fore-arm into position where it might be made useful to its possessor. Let me briefly give the main points in the clinical history of these cases:

CASE VI.—In April, 1886, a nine-year-old errand boy in one of our dry goods stores was sliding down the bannister and fell upon his left elbow, breaking both condyles. His mother brought him to my office, where I reduced the fragments to place and put his injured limb upon a right-angled splint. He did not return as I directed him, and I did not see him again for eight or ten weeks. Then he came back with his injured elbow firmly anchylosed, the fore-arm being about midway between right-angled flexion and complete extension. He had been under the care of another surgeon, who had removed my splint and then put on an anterior splint which kept the fore-arm midway between complete extension and right-angled flexion. An exsection of the elbow joint was not consented to in this case. It took about eight months to get the fore-arm up to a right angle with the arm, by means of oft-repeated and persistent efforts and the use of great force, and during this period I gave the patient ether four times, in order to facilitate the manipulations.

CASE VII.—A twelve-year-old schoolboy while boxing with his brother fell upon the floor and broke off the external condyle of the right humerus, when the fore-arm became dislocated backward. He was sent to my clinic November 2, 1892, having a perforated

metallic splint on the anterior surface of the limb, with the fore-arm about midway between complete extension and right-angled flexion. I removed this splint and found that the elbow joint was quite immovable and useless. The patient was seated in a chair, and I stood behind his right shoulder, so as to prevent him moving it backward, and then I reached over and took hold of his right fore-arm, and employed great force in order to flex it up to a right angle with the arm, infracting the lower end of the humerus in the process. The fore-arm stopped immovably in this position, and I was obliged to desist in my efforts. Then I put the limb upon a right-angled splint. The doctor who had this case under treatment said that he used a right-angled splint for about four weeks, and then removed it. In about ten days the fore-arm became extended, when he applied the obtuse-angled splint I found on his patient's limb. The forcible flexion of the fore-arm injured the ulnar nerve, causing much pain, but after a few weeks it fortunately recovered. The elbow joint has only very slight motion, yet the limb is very useful.

CASE VIII.—In April, 1884, a man, about forty-nine years of age, came to my clinic having his right elbow anchylosed, with the fore-arm fully extended. He said that he fell five weeks previous and fractured his elbow, and that a homœopath had treated his injury with a straight splint, which had been removed a few days before he came to consult me. The limb was hanging by his side and useless. I began to forcibly flex the fore-arm, when the pain was so great that I gave him ether, in order to complete the operation. Before the fore-arm came up to a right angle with the arm I made a compound fracture of the olecranon, causing profuse hæmorrhage. I then completed the operation, and placed the limb upon a right-angled splint. In two or three days I began passive motion of the elbow joint, and kept it up every three or four days until the time of his leaving the hospital. After several weeks I succeeded in giving this patient a strong and useful limb; the motion of the elbow joint was more than one-half the normal, and the man was able to resume his work.

CASE IX.—In November, 1880, I saw Miss B., eighteen years of age, with her family physician. Her left elbow had been broken, and the fragments of the condyles had been carried backward with the upper end of the fore-arm. An anterior obtuse-angled splint had been applied, so as to keep the fore-arm about midway between complete extension and right-angled flexion. When I saw the patient the resistance to flexion of the fore-arm was very great, the elbow joint being quite immovable. I gave her ether, and finally, after

the use of very great force, got the fore-arm to move upward a short distance. I repeated this attempt at two subsequent times, but could not even then flex the fore-arm up quite to a right angle with the arm. In the meantime the family physician kept up passive motion as well as he could under the circumstances. It appeared to me as if the lower end of the diaphysis of the humerus came against the bones of the fore-arm and prevented their flexion. I could have removed some of the disability by an exsection operation, but the friends of the patient refused to have any operative interference.

CASE X.—A strong laborer, about forty-five years of age, came to my clinic in 1890, after having had a fracture of the lower end of the right humerus treated by means of a nearly straight splint. The fore-arm could be flexed only a little beyond the mid-point between complete extension and right-angled flexion. The flexion of the fore-arm stopped at this point, because there was a considerable piece of bone interposed between the lower end of the humerus and the upper ends of the radius and the ulna. His limb was quite strong, but it was very much disabled, since the fore-arm could not be put into a position where it could be made useful. He most emphatically declined to submit to an operation of any kind, and went away with his much disabled limb.

The clinical histories of these nine cases, five of cutting operation and four of joint infraction, are relevant as evidence in the issue touching the attitude of the fore-arm during the treatment of fracture of the lower end of the humerus; such evidence cannot be excluded from the facts which enable us to come to a decision on this issue. That such cases are possible must be admitted beyond any reasonable doubt. There are two questions involved: (1) How shall we treat such cases when they come under our care? (2) How can we avoid having such cases?

The first question has already been answered by the account we have given of the nine cases above reported. That is, we must resort to forcible joint infraction, or to exsection of the elbow joint. Both of these operations require great skill and much care in their execution, and it is certainly possible that considerable disability may be left after their performance. While we may hope to diminish the disability of the upper limb, in the straight position, with a stiff elbow joint, it is possible that

either of these operations may be followed by some surgical accident. But in any such case the advantages of an operation must not be left out of view. Either infract or exsect the anchylosed elbow joint, and so get the best result possible under the circumstances.

How can we avoid having such cases? In some cases of fracture of the lower end of the humerus we have a movable elbow joint. In other cases, no matter what the treatment, we have a stiff elbow joint. It is frankly and fully admitted that the attitude of the fore-arm during treatment of fracture of the lower end of the humerus, in which there results a movable joint, is not material. But it does make a very considerable difference what the attitude of the fore-arm is in those cases of this fracture in which there results a stiff elbow joint. To say that the displaced fragments of a broken elbow can have better reduction when the fore-arm is extended is a very weak kind of evidence, for that does not prevent anchylosis from taking place. In order to obtain a useful limb it may be permissible for the surgeon to leave his patient's limb with some deformity. But it is not the best surgery to leave your patient's limb greatly disabled by trying to get complete reduction of the displaced fragments.

The best way to avoid having such cases, as I have reported above, would be to treat cases of fracture of the lower end of the humerus with the fore-arm in the right-angled position.

It is proper to add a few other points on this issue by way of suggestion. Every surgeon knows the advantage that comes to a patient with a fracture when he can be up and about, and not confined to his bed. It is not advisable to let a patient go about with his upper limb hanging down by his side when it is encased in splints for keeping bony fragments in place; it is better for such a patient to be in his bed. In the treatment of fractures of the elbow it is my custom to put on a right-angled splint, and apply a sling bandage to the fore-arm, and then let the patient go about and even attend to his business as far as he can, only he is required to use as much care as possible under the circumstances, in order to prevent redisplacement of the bony fragments.